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TECHNOLOGY DEPT.

July 14, 1951

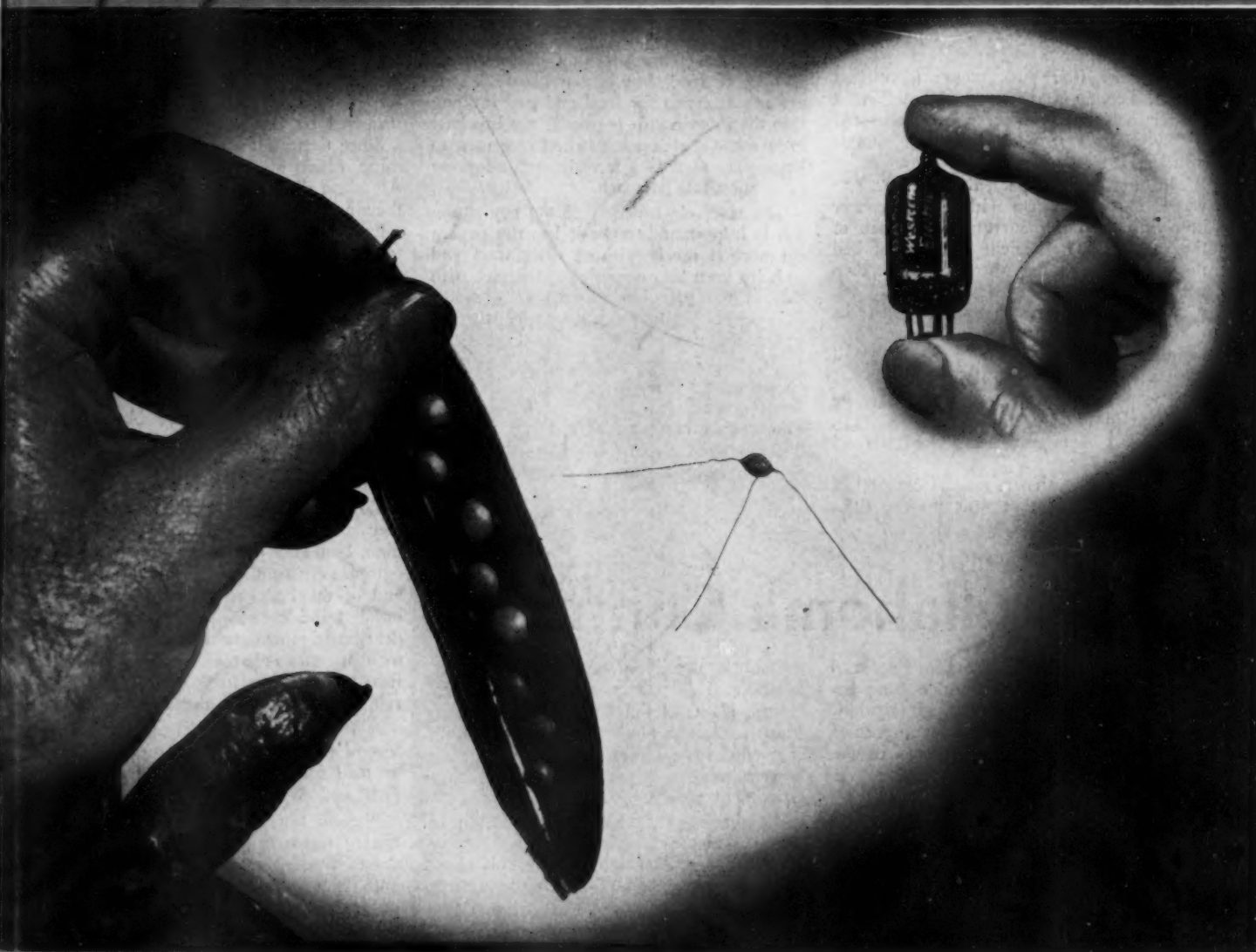
# SCIENCE NEWS LETTER

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JUL 18 1951

DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE



**Amplifier**

See Page 19

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VOL. 60 NO. 2 PAGES 17-32

## SURGERY

# New Stomachs for Patients

Seven cancer patients who had to have their own stomachs removed given new ones by surgical operation to serve as a food reservoir like normal stomachs.

► NEW STOMACHS have now been given to seven cancer patients who had to have their own stomachs removed to save them from cancer death.

Encouraging results in three patients are reported by Dr. C. Marshall Lee, Jr., of the University of Cincinnati College of Medicine, whose early experiments were announced last October, as reported by SCIENCE SERVICE.

The other four patients are mentioned by Dr. Lee, in a report to the American Cancer Society, as having been operated on by another surgeon following similar principles.

The first patient operated on by Dr. Lee was a 53-year-old man with a large cancer involving the outer curvature and back of the stomach. The patient was out of bed the second day after the operation. Two weeks later tests showed, as did X-ray pictures later, that his new stomach was functioning satisfactorily as a food reservoir and its emptying time was that of a normal stomach.

"The patient says he feels as well as he ever had in his life," Dr. Lee states. "His appetite is normal and he eats three normal meals a day."

The new stomach was made from part of the large intestine that runs up the right

side of the abdomen from the appendix region. It is called the right, or ascending, colon. By cutting this free and also a few inches of small intestine and rotating them counter-clockwise, they can be brought up into the stomach location. The piece of small intestine is the right size for sewing directly to the gullet down which food is swallowed into the stomach.

The colon-stomach cannot do much digesting of food, but it can absorb water, act as a reservoir for food and pass it along into the intestines. It is usually not involved even when a stomach cancer has grown to large size, so it is a healthy organ for use as a substitute stomach.

The reservoir function of the new stomach is important because it lets the patient eat normal meals without discomfort and so helps keep him nourished. Difficulty with this in the past has occurred in some of the many cases in which the entire stomach was removed.

Dr. Lee reports that early results "are encouraging" also in the other two patients given colon-stomachs. Long-term results cannot be judged yet. Dr. Lee states the operation should be reserved for patients in whom there is definite hope of cure.

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## AERONAUTICAL ENGINEERING

# New Tullahoma Center

► THE GOVERNMENT Arnold Engineering Development Center under construction at Tullahoma, Tennessee, gives promise of becoming one of the most important applied science and testing stations in the world.

While under the wing of the U. S. Air Force, other branches of the armed services will have a voice in its activities. It is for the development of equipment for all government agencies. It is to develop and test equipment designed for supersonic and hypersonic speeds, both aircraft and missiles, jet propulsion, jet engines and to evaluate all types of air vehicles during their engineering phases. Its work will not be confined wholly to aviation.

The site selected for this laboratory near the southern border of middle Tennessee, has many advantages. It is an inland area far enough from coastal regions to be relatively safe from enemy bombing. It has a plentiful water supply. More im-

portant is the abundant electrical energy available. This will come from the hydroelectric plants of the Tennessee Valley Authority. Electric power in large quantities is needed in a station which will operate large wind tunnels and other facilities for equipment testing.

Another advantage of the location is its nearness to the Atomic Energy laboratories at Oak Ridge. The two sites are only about 100 miles apart. As further progress is made in developing atomic power to airplane propulsion, this may prove important.

Many buildings are planned for this science center. The first laboratory will be an engine test facility. It will surpass similar facilities at the Wright-Patterson Air Force Base in Ohio by perhaps six times.

What may be the world's largest and most powerful wind tunnel is on the program. It will be a continuous-flow type, within which air forced by powerful blowers circles and recircles. Some 200,000 horse-

power may be required to operate it. The tunnel will have two test sections. One will be for supersonic speeds, the other for speeds in the transonic range.

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## NUTRITION

# Frozen Meat Drip Rich in B Vitamins

► SAVE THE "drip" from frozen meat in order to prevent waste of B vitamins. This advice to cooks and housewives comes from the Nutrition Foundation in New York.

More than 12% of the thiamine and 10.3% of the riboflavin, 14.5% of the niacin, 9.4% of pyridoxine, 33.3% of the pantothenic acid and 8.1% of folacin of a good grade of commercial frozen beef appeared in the "drip" when the meat was thawed for 14 to 15 hours, according to studies reviewed by the Foundation.

Since meats supply 30% to 50% of thiamine, niacin and riboflavin in the average American diet, cooking frozen meat before thawing and using the cooking juices in soups or gravies are advised for good nutrition.

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## ICHTHYOLOGY

# Blue-Fin Tuna Carry Hooks for Science

► THOSE WHO fish for blue-fin tuna this summer along the New England coast may catch \$2 more than the price the tuna would normally bring.

To learn something about the life history and the migrations of the blue-fin tuna, biologists of the Woods Hole Oceanographic Institution, Woods Hole, Mass., and of the Fish and Wildlife Service had serial numbers stamped on hooks, then distributed them to blue-fin tuna fishermen in the Bahamas. Many times these fish break off the hook after a strike, carrying the hook with them.

A record of the place and date of the loss of marked hooks is kept and \$2 will be paid for recovered hooks by the U. S. Fish and Wildlife Service.

Blue-fin tuna have become an important fishery resource along the eastern Atlantic shores from New Jersey to Nova Scotia, both as a commercial catch and in terms of general sport-fishing expenditures. The tagging program is only a part of the general biological studies to determine the age, rate of growth, spawning season, spawning areas and migration of the blue-fin tuna.

Present study will show whether the schools of blue-fins swimming past the Bahamas in the spring are the same tuna that are caught along the coast from New Jersey to Nova Scotia during the summer months.

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## ELECTRONICS

# Bead Amplifies Current

Small electrical bead, only half-pea size, amplifies current a million times. Called a junction transistor, it operates on a millionth of a watt.

## See Front Cover

➤ A RADICALLY new and effective amplifier, called a junction transistor, was announced by Bell Telephone Laboratories.

Although only half the size of a pea, it amplifies electrical signals a million times. It requires only a millionth of the power of the smallest miniature electron tube that it threatens to replace.

The new spidery object consists of a small bead, 3/16 inch in diameter, with three wires extending from it. It is extremely efficient and rugged. It operates on about a millionth of a watt, which is far less power than an ordinary flashlight bulb.

Its inventor is Dr. William Shockley who during the past three years has directed the research group pioneering the development of the new amplifying transistors, a new group of electrical device.

The radically new type of transistor now produced in small quantities has "astounding properties never before achieved in any amplifying device."

The junction transistor consists of a tiny rod-shaped piece of germanium, treated so that it contains a thin electrically positive layer sandwiched between the two elec-

trically negative ends. The entire rod is encased in a hard plastic bead with wire leads connected to each of the three regions. This new transistor occupies about 1/400 of a cubic inch, whereas a typical sub-miniature tube occupies about 1/8 of an inch.

Transistors are devices that are based upon the properties of materials called semiconductors, among which is the metal germanium. Transistors can act as amplifiers for telephone and television circuits and provide detection and amplification as in ordinary radio sets. Another kind of transistor can serve as a photoelectric cell.

In addition to the new type of transistor, the original type of transistor has been developed so that these devices will be put into actual use in the Bell System early next

year. They are now made so as to be uniformly reliable and uniform as to characteristics.

Associated with Dr. Shockley are Morgan Sparks and G. K. Teal, who built the first of the new type transistors, R. L. Wallace, Jr., and W. J. Pietenpol, who have been working on their development, and J. A. Morton, who directed work on the reliability and reproducibility of transistors.

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## INVENTION

## Resin Makes Paper as Strong When Wet as Dry

➤ PAPER THAT is strong when wet as well as when dry is made of the ordinary cellulosic paper-making fiber to which a melamine-formaldehyde resin is added. After the material has been formed into a felt, heat is applied to cure the resin.

Patent 2,559,221 was granted to Charles S. Maxwell, Old Greenwich, and Chester G. Landes, New Canaan, Conn., the inventors. American Cyanamid Company of New York has acquired the patent rights.

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## NUTRITION

## Powdered Eggshell Makes Better Gingerbread

➤ GINGERBREAD, hot rolls and other baked goods from prepared mixes will taste a little better and be quite a bit more nourishing if powdered eggshell is added to the mix.

Tests showing this were reported by Dr. Helen B. Burton and Miss Eula Mae Lincecum of the University of Oklahoma at the meeting of the American Home Economics Association in Cleveland.

Calcium carbonate, or chalk, also gave good results.

Object of adding either substance is to increase the amount of calcium in the diet. American diets often are lacking in sufficient of this bone and tooth building chemical. The rising cost of milk, our best food source of calcium, often prevents families from improving their diet by using more milk, Dr. Burton pointed out.

The powdered eggshell and calcium carbonate would be inexpensive ways of adding calcium to the diet.

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**NEVADA ATOMIC EXPLOSION**—Although unlike any of the now familiar above-ground atomic bursts, this official Atomic Energy Commission photograph shows an atomic explosion at Frenchman's Flat, Nevada, during the January-February tests. The picture is available in color. (See page 30.)



## MEDICINE

# Chemicals Reduce Pressure

**Methonium halide chemicals reduce high blood pressure and bring about improvement in eye symptoms. Two or three injections per day needed.**

► **CHEMICALS** WHICH reduce high blood pressure and bring improvement in eye symptoms such as retinal hemorrhages, in headaches and dizziness, exercise capacity and heart disorders are reported in the journal, *SCIENCE* (July 6).

The chemicals are known by the general name of methonium halides. Scientists in England have been experimenting with them. The report of successful use of one of these chemicals, hexamethonium bromide, is from Dr. F. Horace Smirk of the University of Otago in New Zealand.

Two or three injections under the skin daily make it possible, Dr. Smirk finds, "without adverse symptoms, to secure a more substantial reduction of blood pressure than has ordinarily been practicable hitherto."

Patients develop tolerance to the chemicals from repeated doses, making it necessary to increase the dosage. The beginning dose of 15 milligrams sometimes has to be increased to as much as 200 milligrams.

Using an electrically driven syringe, Dr. Smirk has been able to give slow, continu-

ous injections of the drug over a 24-hour period. By refilling the syringe daily, this can be kept up for 10 days or longer. By this means, the blood pressure of severely sick patients, with pressures at 260/150, for example, has been kept at about normal levels of 130/90 day and night for 10 days or more.

In severe cases it has been possible by a methonium injection to reduce the blood pressure by as much as 140 systolic and 80 diastolic, "which reduction," Dr. Smirk points out, "is of the same order as the entire normal blood pressure (120 systolic, 75 diastolic)."

The effects of test doses have been studied in 170 patients. Treatment of one to 16 months duration has been in progress in 68 patients, including high blood pressure of the malignant, essential, renal (kidney) and postpregnancy toxemic types.

It is clear, Dr. Smirk concludes, that blood pressure reduction can be obtained in high blood pressure cases irrespective of cause and also in normal controls.

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of body chemistry conducive to development of deficiencies even when eating what is a nourishing diet for most people. As a result, according to this theory, various diseases including alcoholism may develop. To remedy the condition, according to the theory, the patient must get the particular vitamins his body needs.

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Spraying with a solution of common salt in water is effective in killing many of the weeds that grow among beets in the garden without injuring the beets themselves.

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## MEDICINE

# Alcoholics Can Now Drink

► **FOOD AND** vitamin pills will "cure" alcoholics "so they can drink occasionally without any excessive urge," Dr. Roger J. Williams, professor of chemistry and director of the Biochemical Institute at the University of Texas, claims in his new book, **NUTRITION AND ALCOHOLISM.**

Merely taking vitamins in addition to a good diet, however, is not the method Dr. Williams claims has cured alcoholics. The diet and vitamins must be specially prescribed for each patient.

This is because Dr. Williams believes some people are born with a disturbance

## Question Box

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What barriers are keeping lampreys from spawning? p. 29.

### MARINE BIOLOGY

How do scientists hope to find out purpose of porpoise's noises? p. 21.

### MEDICINE

How can the effect of new treatments on cancer and leukemia patients now be tested? p. 23.

What drug has been found to help those with hangovers and jitters? p. 24.

**Photographs:** Cover, Bell Telephone Laboratories; p. 19, Los Alamos Scientific Laboratory; p. 21, Woods Hole Oceanographic Institution; p. 23, National Bureau of Standards; p. 26, Myers Studio, Inc.

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### PETROLEUM ENGINEERING

What is the new, cheaper method for getting oil from shale? p. 24.

### PHYSICS

How does the Empire State Building steal lightning's thunder? p. 28.

### RADIO

What rate is required to pass the recently simplified test for amateur radio license? p. 26.

### SURGERY

How are cancer patients now being given new stomachs? p. 18.



**WHISTLING PORPOISES**—Taken in the Gulf of Mexico, this photograph shows three of the dolphins whose whistles were clearly heard aboard the Woods Hole Oceanographic Institution's *Atlantis*. The same type of dolphins were silent when spotted and listened to off the Florida Coast.

## MARINE BIOLOGY

## Purpose to Porpoise Grunt?

Does porpoise talk to others of its kind when whistling or grunting, or just make noises? Tape recordings may give answer.

► WHEN A porpoise whistles or grunts, is he talking to another porpoise, or is he just making noises? William E. Schevill, research associate at the Woods Hole Oceanographic Institution, Woods Hole, Mass., hopes to answer that question through means of high fidelity tape recordings of porpoise noises recently made off the coast of Florida.

Mr. Schevill actually played back to the porpoises, or dolphins, some of the recordings he had made, but how their recorded voices affected them, he is not yet prepared to say.

He knows enough about their voices to know that they range much higher in frequency than do sounds the human ear can hear. Before he can be sure that he will be playing back to the porpoises all that they hear naturally, he must secure equipment that can play such high frequency recordings.

Once that is done, he hopes to be able to solve a problem which has been puzzling scientists since it was known that porpoises

"speak." That is—do they have anything to say?

Mr. Schevill has made copies of previous recordings of porpoise voices and sent them to museums. However, these recordings are not wide enough in frequency range.

His present work is sponsored jointly by the Office of Naval Research and the Woods Hole Oceanographic Institution.

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## INVENTION

## Enlarged Stem of Floor Lamp Conceals Radio

► FLOOR LAMP for the home has an enlarged stem, or upright, within which is a radio receiver and loudspeaker. Both are completely concealed except for the controls. The upright is designed and finished to harmonize with the household furniture. Patent 2,559,045 was awarded to Louis Leon Lucien Petel, Levallois Perret, France, for this invention.

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## MEDICINE

## Expert Confident Polio Cure by Drugs Possible

► "THE RIGHT drug will come along eventually" for polio, Dr. Thomas Francis, Jr., of the University of Michigan School of Public Health predicts in a report to the National Foundation for Infantile Paralysis in New York.

The reason sulfa drugs, penicillin and other antibiotics, so effective in many infectious diseases, do not work in polio and other virus diseases is found in the fundamental differences between bacteria and viruses.

Bacteria, Dr. Francis pointed out, are self-sufficient organisms compared to viruses. They live outside the cell and can use food from many sources. The viruses establish themselves inside the cells of the body. They utilize chemicals essential to the life of the cell itself. As a result, the cell may be injured beyond repair. In the case of polio, the infected nerve cells that die are not replaced, and the function of the muscles they supply is lost.

Polio, according to the best evidence now, is basically an infection of the alimentary, or food, tract. The virus, Dr. Francis said, gains entry to nerve cells along the nerves from the throat or intestines.

"If this is correct," he stated, "the danger of paralysis could be eliminated by drugs that would prevent the establishment or multiplication of the virus in the alimentary tract before it extended to the nerves. Such a drug, if successful, also would eliminate the further spread of the virus to other persons through infected excreta."

Science News Letter, July 14, 1951

## INVENTION

## Patent Improved Type of Waxed Wrapping Paper

► WAXED WRAPPING paper of better quality is promised with a wax composition and method of making it that brought patent 2,559,398 to Robert G. Capell, Pittsburgh, Pa. Rights are assigned to Gulf Research and Development Company of the same city.

The feature of this composition is high tensile strength which prevents it from cracking and breaking when the wrapper on which it is used is roughly handled, crumpled and bent.

This composition contains bentonite, a type of clay found in many parts of the United States. It uses a bentonite-organic base compound with any of the solid or semi-solid waxes. Especially valuable results are obtained when a petroleum wax is used. The resulting product with petroleum wax has not only higher tensile strength but lower penetration and a higher melting point than the original wax.

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## AERONAUTICS

# Super-Fast Lengthy Flights

Long-range flights at supersonic speeds may require development of atomic fuel. Skyrocket plane piloted faster and higher than ever recorded before.

► LONG-RANGE AIRPLANE flights at speeds far greater than that of sound, such as a short flight recently made by the Douglas Skyrocket piloted plane, will require power plants and fuels not now in use. Perhaps they will await the development of atomic power.

Rocket power was used to send the Skyrocket through space at a speed of about 1,200 miles per hour, since the speed is said to be nearly twice that of sound which, at the altitude at which the plane flew, is about 660 miles per hour. Rocket power was used also in the X-1, which is credited as being the first piloted plane to break the so-called sonic barrier, a condition encountered at the speed of sound.

Rocket engines, reaction engines they are called, can give plenty of power. But the planes equipped with them can not carry enough fuel to remain in the air for an extended period. They have to carry not only fuel but oxygen for combustion.

The rocket engine is a type of jet engine. But it does not obtain the necessary oxygen for combustion from the air. It carries its own supply, usually in what is called a monofuel. This is a mixture of a high-energy fuel and a chemical that releases oxygen for combustion. For this reason the rocket can speed to high altitudes into the

thin atmosphere that contains too little oxygen for ordinary engines.

This Navy sonic research plane, the Douglas Skyrocket, in recent tests made in California, attained the highest speed and altitude ever recorded by a piloted aircraft. The actual speed and altitude are not revealed. However, it traveled faster and at a higher altitude than achieved by the Air Force's X-1, which reached a speed of over 1,000 miles an hour and rose to an altitude of 63,000 feet.

The Skyrocket that made the new records is unlike the standard Skyrocket that holds the world's official speed record of nearly 671 miles per hour near sea level where the speed of sound is approximately 760 miles per hour. The plane is a sweptback winged affair, which first flew in 1948, with combined jet and rocket power. This plane had the jet engines removed to make room for rocket fuel. It was carried aloft under the belly of a B-29 and released at 35,000 feet.

It was then on its own, and its rocket power took it to an altitude thought by some to be about 70,000 feet. There it leveled off and spurred to a speed estimated by some to be between 1,200 and 1,300 miles per hour. With rocket power exhausted, it glided to the earth. Its flight on its own was close to 15 minutes.

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## MEDICINE

# Home Poisons May Kill

► MORE THAN 600 children die each year because they accidentally swallowed poison of some kind. Many more swallow poison and recover after proper treatment. But these survivors may be left with permanent disabilities, Dr. Jay M. Arena of Duke University School of Medicine warns.

Dr. Arena blames careless parents for many of the accidental poisonings of children. In a report to the American Medical Association meeting in Atlantic City he stated:

"Poisons contained in household agents are responsible for most of the deaths and disabilities. If all drugs and household agents that contain poison were made inaccessible to children, such poisonings could be almost entirely prevented."

Lye, he explained, is one of the most common causes of poisoning in childhood. During the first 18 years of the Duke Hospital, more than 136 children were

treated for stricture of the esophagus caused by swallowing lye. Many of these cases were due to sodium hydroxide in washing powders, drainpipe cleaners or certain paint removers.

Among other causes of childhood poisonings listed by Dr. Arena are the following:

Strong acid: Hydrochloric acid is present in some metal-cleaning fluids. Even lactic acid when taken in large amounts occasionally has caused poisoning in children.

Kerosene: The fluid often is left carelessly about the home in a soft drink bottle, and thirsty toddlers do not hesitate to sample it.

Iodine: Children may be attracted by its rich color and pungent odor. An unstable adolescent or preadolescent may take iodine in a dramatic attempt at suicide because usually it is the most available bottle with a "poison" label.

Other home products which frequently

contain poisonous ingredients include moth balls and moth flakes; roach, ant and rat poisons; insecticides, paints and dyes. Some cosmetics also contain arsenical preparations.

First aid treatment will depend entirely on the nature of the poison. The label of some containers lists specific antidotes. Medical aid should be summoned immediately.

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## INVENTION

# Bone Char for Refining Sugar Made Reusable

► THE PROCESS of refining cane sugar, in which great quantities of bone char are used for decolorizing, is decreased in cost by methods of regeneration of the char so that it can be used over and over again. An improved process to accomplish this purpose brought patent 2,557,948 to Victor R. Deitz of the National Bureau of Standards, Washington, D. C. The patent is assigned to the government as represented by the Department of Commerce.

This new process greatly decreases the amount of water now used to wash the char to remove inorganic impurities. It consists of treating the char with a solution of an ammonium salt of an organic acid. This replaces inorganic ions adsorbed in the sugar-clarifying process with volatile ions which can be driven off by heat.

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## INVENTION

# Oxygen-Containing Fuel For Gas-Turbine Engines

► GAS TURBINE engines in airplanes may become more widely used with a so-called monofuel which contains, in addition to the combustible material, an oxygen-releasing chemical which supplies the necessary oxygen for combustion. Present fuels used in rockets contain sufficient oxygen to assure combustion.

This newly patented monofuel can be used in rockets, or in other situations where a self-sufficient fuel is desired, but it is recommended particularly for gas turbine engines to permit them to operate without dependence on the atmosphere for oxygen.

The propellant comprises a mixture of approximately 80% to 90% by weight of a methane known to chemists as tetranitromethane as an oxidizing agent, less than 1% of an inhibitor to control the rate of combustion such as tetraethyl lead, and the balance an unsaturated organic liquid fuel such as benzene.

Inventor is John A. Hannum, Detroit, Mich. Patent 2,559,071 was issued to him. Patent rights have been assigned to Borg-Warner Corporation of Chicago.

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## MEDICINE

# Tell if Cancer Drugs Work

Test developed to determine whether treatment for cancer or leukemia will help a particular patient. May save weeks of waiting.

➤ **CANCER** and leukemia patients may be saved days and weeks of waiting to see whether a new treatment will help them by having a test of two chemicals in their blood serum, Drs. Frank W. Ellis and Philip M. West of the Veterans Administration Hospital at Long Beach and the School of Medicine of the University of California at Los Angeles report.

The test is not a diagnostic test to determine whether the patient has cancer. It is a test to see whether hormone treatments, urethane and other chemicals will help a particular patient temporarily, even if they do not cure him. A recurrence or reactivation of the disease may also be picked up by this test before it has gone so far that the patient cannot stand intensive treatment.

Measuring the amounts of two chemicals in blood serum and determining the proportions of one to the other is essentially what the test is. The two chemicals are in-

hibitors, substances that block the activity of the enzymes rennin and chymotrypsin.

The chymotrypsin inhibitor apparently is an index of cancerous activity and the rennin inhibitor reflects the resistance of the host, or patient. Why these chemicals reflect this change in the activity of the cancerous disease is not known. Drs. Ellis and West are now trying to determine the source of these inhibitor chemicals, their biochemical nature and the mechanism by which they are released into the blood stream.

The value of the test in trial of new drugs and management of the cancer patient has been substantiated by daily use of it for three years during which time over 30,000 tests have been made. In their report to the *JOURNAL OF CLINICAL INVESTIGATION* (June), Drs. Ellis and West state that in "by far the majority of cases" seen in a tumor service the results of the test make up "the only simple and objective indicator of the patient's progress."

"Frequently," they point out, "an individual with cancer, in his enthusiasm over a new drug, may feel that he is benefited, but the enzyme patterns reveal whether or not there is any basis for his subjective improvement."

"On the other hand, highly significant but weak, subclinical effects on the tumor may be produced by an agent under investigation which would have escaped notice without a sensitive measure of neoplastic (cancerous) activity."

The aim of treatment, they report, is to keep the chymotrypsin inhibitor at five units or less and the rennin inhibitor at 15 units or more. This equilibrium between the two has been found associated with complete checking or regression of the tumor.

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## AERONAUTICAL ENGINEERING

## Giant Electric Wind-Tunnel Motors Use Liquid Rheostats

➤ **THE GIANT** electric motors that will power the world's most powerful wind tunnel to be built by the government at the Arnold Engineering Development Center, Tullahoma, Tenn., will be controlled by liquid rheostats, the largest ever built, Westinghouse engineers revealed. The rheostats will be constructed in the Westinghouse plant in Buffalo, N. Y.

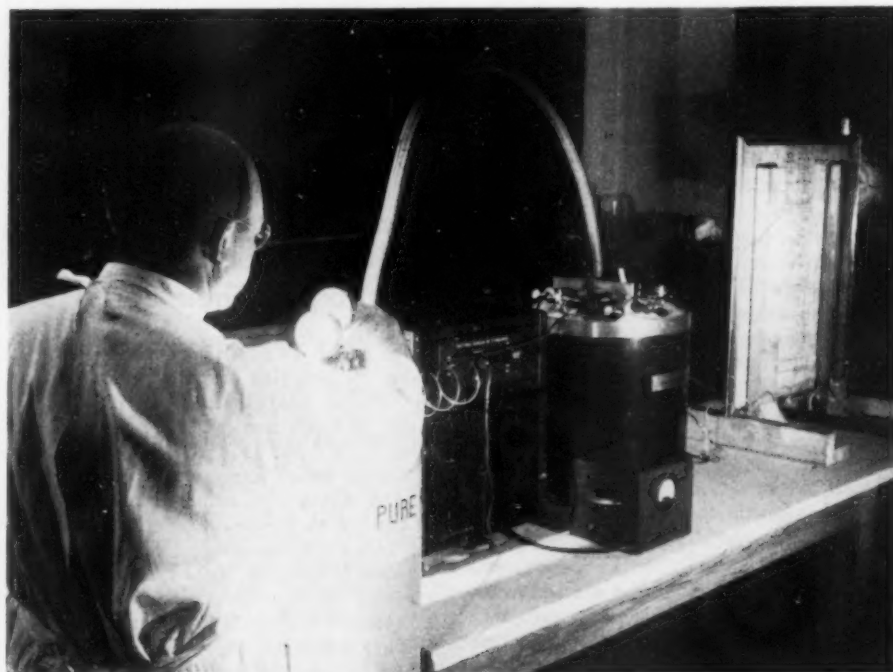
Rheostats control the speed of motors by regulating the amount of electric current delivered to them. They introduce more or less electrical resistance into the circuit to decrease or increase the current flow. In the liquid type, the current passes through an alkaline solution from one electrode to another. One electrode is adjustable so that the distance through the solution can be changed.

Two liquid rheostats will be used on this installation. Each will be more than 20 feet high, and will contain three nine-foot tanks in which the alkaline solution is circulated. The bottom electrode in each of these vertical tanks is stationary and is a nickel-clad steel plate.

The upper electrode is attached to a movable plunger-like support at the top. The three tanks operate as a single unit. A particular feature of these rheostats is ability to dissipate rapidly the heat created within them.

The wind tunnel to be constructed soon at the Arnold Center, which will be a great research institution under the U. S. Air Force to study problems concerned with supersonic aircraft and missile speeds, will have a multi-stage compressor system that will require over 200,000 horsepower to operate. Two of the motors to be used will be the most powerful in the world, it is claimed. They will exceed the 65,000-horsepower rating of the Westinghouse motors built for Grand Coulee Dam in the state of Washington.

Science News Letter, July 14, 1951



**PRESERVING THE CONSTITUTION**—The Constitution and the Declaration of Independence of the United States will be permanently preserved in specially designed glass enclosures filled with helium. Here E. C. Creitz of the National Bureau of Standards, which developed the method, adjusts the flow of pure helium into the humidifying unit from which it is directed into the document enclosure.



## INVENTION

**Improved Brush Killer Hits Roots as Well as Foliage**

► **ROOTS** AS well as the overground parts of woody plants are killed by spraying the foliage of the brush or shrub with a chemical mixture that contains the weed-killer known as 2,4-D and a vegetable oil with special characteristics. Technically, it is a preparation of a chlorinated phenoxyacetic acid herbicide in a non-phytotoxic horticultural oil.

Other herbicides instead of 2,4-D may be used but this is the preferred one. The important feature is the oil. Non-phytotoxic means it contains no poison of vegetable origin. It must have a boiling range of 500 to 636 degrees Fahrenheit, and an unsulfonated residue of 94%. The high boiling point prevents evaporation in hot weather to eliminate danger to nearby desirable plants.

Other sprays to kill unwanted shrubbery on lawns, in pastures and other places, and to kill seedlings and saplings growing as underbrush among forest trees, do not get into the roots under ordinary procedures, the inventor of this preparation claims. This is said to be effective without cutting into the bark or even covering the entire foliage with the spray.

Inventor is Emerson B. Stull, Sebree, Ky. He received patent 2,557,618. Rights have been transferred to Stull's Chemicals, Inc., of the same town.

Science News Letter, July 14, 1951

## AERONAUTICS

**Air Force Instructors Travel From Factory to Repair Crew**

► **PILOTS, CREWS** and ground repairmen need constant education to know all about the new planes, new engines, new instruments and navigation aids which they are being required to understand and handle. How the U. S. Air Force is providing this education at a minimum of cost was revealed at the Wright-Patterson Air Force Base, Dayton, Ohio.

Special instructors are employed at various Air Force bases to instruct local personnel. All their time is spent either in a factory classroom assimilating knowledge or in an Air Force classroom imparting knowledge. Their main job is teaching men of the ground crews the intricacies of new equipment so that proper maintenance will result.

Some of these instructors are trained to service one piece of equipment and become specialists on that particular accessory. Others are professional teachers who make periodic visits to factories, whenever a new piece of equipment is purchased by the Air Force, and spend their time between attendance at factory schools and in instructing experimental and maintenance personnel. It costs much less to send one man

to the factories to gather the necessary information than it would to send entire ground crews.

The training of this type has become increasingly important as airplanes have become more complex. The greatly increased use of electronics is an example. The field of electronics is complex and becoming more so as new developments are made and airmen get nearer the push-button stage of warfare, with planes flown by remote control.

Radar, inter-communication systems, faster firing guns, use of oxygen and pressurized planes for high-altitude flying and all the many navigational instruments in the modern plane require a host of highly-skilled technicians. This educational program is supplying them with up-to-the-minute information.

Science News Letter, July 14, 1951

## PETROLEUM ENGINEERING

**New Reduction Process Gets Economical Oil from Shale**

► **A NEW** "gas combustion" method of extracting oil from oil shale in a continuous process, developed by the U. S. Bureau of Mines, will soon be in use in a demonstration-scale retort for which a contract has already been made. The retort will have a capacity of 150 to 400 tons of oil shale daily, and will probably be in operation in a year.

"If the new retort operates as anticipated, we have an excellent chance of producing crude shale oil at a cost competitive with natural petroleum," Boyd Guthrie, chief of the Bureau's oil-shale demonstration plant in Rifle, Colo., stated. "The grade of oil obtained will be somewhat inferior to the average petroleum, but finished products of good quality can and will be refined from it."

This new process gets its name from the fact that it uses as a source of heat for retorting a gas obtained from the shale and burned in the presence of air. Unlike other retorting processes, it requires neither water nor an elaborate system for condensing the liquid products that come from the retort in the form of mist.

Even more important, Mr. Guthrie said, investment and operating costs for the new process will be substantially lower than those for other methods tested at Rifle. This means product costs will be lower.

Crushed oil shale is fed in a continuous stream into the top of the vertical retort and moves downward by gravity against a rising stream of gas. Air is injected near the center of the vessel and the gas burned to provide heat for retorting.

As the rising gas from the combustion zone and the downward moving shale pass each other, the shale is heated and the gas is cooled. The gases leaving the retort are laden with oil-mist. An oil-collecting system removes the oil.

Science News Letter, July 14, 1951

## IN SCIENCE

## MEDICINE

**Relaxing Drug Helps Hangovers and Jitters**

► **ALCOHOLICS** WITH a severe hangover can be helped to get over the jitters and depression and to get back their appetite for food within 48 hours through a muscle-relaxing drug, mephenesin. Its trade names are Myanesisin and Tolserol.

Drs. Morris Herman and Abraham S. Efron of New York University-Bellevue Medical Center gave it to 50 alcoholics who were admitted to Bellevue Psychiatric Division at the end of prolonged sprees.

The drug was given by mouth, either as an elixir or in capsules. Most of the patients got it every three hours for five or six daily doses.

Of the 50 patients, 37 were eating, quite a few "better than usual," by the next day. In a control group of 10 untreated patients, only two were markedly improved in the same time and four of the 10 did not begin to eat voluntarily until the third, fourth or fifth day.

In 33 patients, Tolserol was especially good in overcoming the jitters or tremulousness. Only two did not improve in this respect in 48 hours. Many patients said that not only was the "outward shaking better" but "it felt better inside, too."

The drug did not help much toward sleeping. Only 12 got a full night's sleep within 48 hours.

Science News Letter, July 14, 1951

## MEDICINE

**ACTH Keeps Nerves Functioning Their Best**

► **ACTH, PITUITARY** gland hormone famous for relieving crippled, painful joints in arthritis, has still another effect on the body. It keeps nerves functioning at their best.

Studies which suggest this were reported by Drs. Clara Torda and Harold G. Wolff of New York Hospital-Cornell Medical Center and the Kingsbridge (Veterans Administration) Hospital, Bronx, N. Y., at the meeting of the Association for the Study of Internal Secretions in Atlantic City, N. J.

They tested the effects of ACTH and five other hormones from the pituitary gland. The tests were made on rats that had their pituitary glands removed. Of all these and thyroxin, the thyroid gland hormone, only ACTH was able to restore nerve function to normal as measured by its action potential and its ability to create the nerve chemical, acetylcholine.

Science News Letter, July 14, 1951



# ENE FIELDS

## AERONAUTICS

### U. S. Needs 5,000 New Or Better Airports

► NEARLY 5,000 new or improved civilian airports in American territory are needed to meet the demands of aviation now and during the next three years, it is stated in a report of the Civil Aeronautics Administration. The report is the annual summary on landing field needs entitled the National Airport Plan.

It lists 4,945 locations by states and local areas at which airports should be constructed or improved to meet present and early anticipated needs. Of these 4,815 are within the continental limits and 130 are in the territories. New airports needed total 2,288, while 2,657 require improvements. CAA estimates that \$662,000,000 is required to carry out this national airport plan. Approximately one-half of this would come from the federal government and half from local sponsors. The great majority of the ports listed for construction or improvements are for the smaller planes. But included are 444 for trunk airports, express airports and continental airfields. Also in the list are 304 seaplane bases and 83 heliports.

Copies of the 1951 National Airport Plan may be obtained from the U. S. Government Printing Office, Washington, D. C., at \$1.25 each. (See page 30.)

Science News Letter, July 14, 1951

## ENGINEERING

### Battery-Trolley Combination Proposed for Locomotives

► A COMBINATION of trolley power and battery power to operate railway locomotives was proposed to the American Institute of Electrical Engineers meeting in Toronto, Canada, by Llewellyn Evans, consulting electrical engineer of the Tennessee Valley Authority.

Silver-zinc storage batteries would be used, he said. They weigh one fifth as much per kilowatt-hour stored as conventional batteries. Their use will await development of the battery to include heavy duty items.

Sections of the railway using the combination would be equipped with trolleys to deliver power to the locomotive, and other sections would rely on power from the batteries. There would be enough trolley sections to keep the batteries charged without layups, he stated. A rectifier charger aboard the locomotive, making both 25- and 60-cycle power equally usable, would add to the flexibility.

Science News Letter, July 14, 1951

Relative economy of the diesel-electric locomotive, now becoming popular with American railroads, and electric locomotives was discussed by T. M. C. Martin of the Bonneville Power Administration. Over a period of years, he indicated, the electric locomotive might prove a money saver in regions where hydroelectric power is available.

Each electric locomotive costs more than double as much as the diesel-electric but the cost of operating, where electric power is not too costly, is less. Speaking of the American Northwest, he stated that the cost of operating 20 diesels would be \$5,520,000 a year, while 20 electric locomotives would cost \$3,900,000 to operate. The principal saving is in the cost of diesel oil vs. electricity. In a 10-year period this saving would be equal to the additional cost of electrics over diesels.

Science News Letter, July 14, 1951

## MEDICINE

### Sweet Potato Disease Threatens Far East

► SWEET POTATOES are under attack. Americans in this country will probably have enough for dinner next Thanksgiving, but in the Far East the situation appears to be serious.

The attacker is a new virus disease, the world's worst virus disease of sweet potatoes. It has appeared in the Ryukyu Islands since the close of the war and has already caused so much destruction that sweet-potato culture there has been discontinued in large areas. Scientists there think it was brought back by natives repatriated from Tinian or Saipan but there is some doubt about this.

The disease is a "definite threat to sweet-potato growing in other parts of the world, particularly Japan," Eaton M. Summers, agriculturist of the U. S. Civil Administration of the Ryukyu Islands, reports to the Department of Agriculture.

This could readily prove to be a major disaster, he points out, because the sweet potato is an important crop there, furnishing 13% of the native food production.

The disease is called "ishuku-byo" in the Ryukyu Islands, which Mr. Summers translates as "dwarf." No edible sweet potatoes are produced on diseased vines and little or no latex is present in diseased plants or roots.

Attempts to control the disease by roguing have been only partly successful and cannot be expected to provide any permanent benefit. Mr. Summers advises sending all Japanese varieties of sweet potatoes to the Ryukyus to learn whether any are resistant to this disease. Resistant varieties, if any, should then be used in future breeding programs to provide a practical means of stopping the threat to Japanese sweet potato production.

## MEDICINE

### Big Appendix Tumor Found by Accident

► THE PATIENT, a 54-year-old man, called the doctor because he had mumps and a bad sore throat. But the doctor found on examination that, in addition to the mumps and throat inflammation, the patient had a tumor of the appendix so big it filled the lower half of the abdomen from wall to wall.

The patient had never, recently or in the past, had any pain, distress or abnormal feeling in the abdomen.

This is "most uncommon," Drs. David Stanley Likely and Condict Walker Cutler, Jr., of New York, point out in reporting this unusual case to the New York State Journal of Medicine (May 1).

Usually patients with such a tumor will have recurring, vague or not too severe pain in the right lower fourth of the abdomen, but without the fever, high white blood cell count, vomiting and rigid muscles of acute appendicitis.

When Dr. Cutler operated, he found a large cyst, known technically as a mucocele. Operation, he and Dr. Likely point out, is the only satisfactory treatment for this condition. They warn doctors to suspect it in cases where a mass that is not tender can be felt in the right lower quadrant with the symptoms that are not typical of acute appendicitis.

Science News Letter, July 14, 1951

## TECHNOLOGY

### New Bonding Material Holds Silicone Rubber to Metals

► A GLUE-LIKE bonding material, developed by General Electric chemists in Pittsfield, Mass., promises to increase greatly the use of silicone rubbers because it makes a firm union between them and such materials as steel, glass, aluminum, ceramics, tin, copper and other metals.

There are many applications for which this war-developed synthetic rubber is particularly suitable, even more suitable than natural rubbers and other synthetics. It withstands relatively high and low temperatures. It is little affected by ultraviolet radiation. Like other silicones, it is a chemical compound of organic material with silicon, such as found in ordinary sand.

To produce the bond, this new liquid material, is brushed or sprayed on the glass or metal surface to which the silicone rubber is to be attached. After drying, the surfaces are placed together under light pressure at about 250 degrees Fahrenheit. The resulting bond withstands temperatures from 85 degrees below zero to 500 degrees above, and is said to make a bond with a strength of about 700 pounds per square inch of holding area.

Science News Letter, July 14, 1951

## RADIO

# Amateur Radio Made Simpler

**New license drops code rate to only five words per minute. Examination simplified, too, to attract many more into hobby of radio communication.**

By WATSON DAVIS

► IT IS easier than ever before to have your own amateur radio station and talk in code and by voice with fellow "hams" nearby and in distant lands.

A new form of federal radio license for novices is now being issued by the Federal Communications Commission. It reduces the necessary ability to send and receive code to a mere five words a minute. This speed of dit-dahhing is considerably less than the 13 words per minute required for standard amateur licenses. The written quiz given by the government examiners is also simplified for the new novice class. Only enough questions are asked to be sure that the licensee knows enough about radio to keep him from interfering with other radio services.

Intended to make it easy for more young and old people to work in practical electronics in their spare time, the novice amateur license, good for one year introduction, is expected to add many thousands to the more than 90,000 federally-licensed amateur radio operators.

Even without a license, anyone may build a simple one-tube regenerative receiver for the short waves in a few hours at a cost of \$10 to \$15. This can be used to listen in on the busy amateur bands and learn the code in which combinations of dots and dashes mean letters and figures.

## Build Transmitter Cheaply

For about the same cost and in little time, a transmitter may be built, complete with power supply. This will allow the new amateur to get "on the air" as soon as he gets his licenses, one for himself and one for his station. He can then become a HAM (radio amateur) and GA (go ahead) with CQ (which is the general call to any other stations wanting to talk) and become a "ragchewer" with other OM (old men, which all male amateurs are regardless of age) or even with a YL (young lady) or XYL or OW (old woman, if she admits that she is married.) Or he may become a DX (distance) fan and try to talk in code with the farthest and strangest amateur he can get to answer his CQ.

Like any hobby, amateur radio is sometimes considered by onlookers as a strange time-consuming mania. It makes its devotees stay up all hours of the night, chattering in code and voice over the dozen or so bands in the radio frequency spectrum that are now allocated amateurs for regular and experimental use.

But amateur radio is a great national asset for peace and war.

In time of emergency and disaster, such as floods and explosions, amateur stations become the means of communication when other means fail. One of the functions of the American Radio Relay League is to provide this essential service, along with fostering the general growth of amateur radio activities.

From the ranks of amateurs of past years have come leaders of electronics of today, the men who have contributed to radio, television, radar and a dozen other branches of this large new industry. For example:

Maj. Edwin H. Armstrong, inventor of frequency modulation radio broadcasting and other important radio developments, began his career as a Greenwich, Conn., amateur. Dr. Allen B. DuMont, head of the television manufacturing concern, built his first "wireless" set as a schoolboy.

The new novice license was planned to attract many young people to amateur radio as a hobby. Some of them will get

their start in electronics in this way. Many more will learn much and have fun with a hobby they can enjoy all their lives.

No physical examination is necessary for becoming a radio amateur. Some of the most enthusiastic amateurs are those who are bedridden, or blind, or otherwise physically handicapped.

To encourage experimentation on the very high frequencies and microwaves, there is another new kind of radio license, the technician class, which requires only the slow five words per minute code ability, but the standard, tougher written examination for amateurs. These radio specialists, more interested in experimentation than in communication, can use only the very high frequencies above 220 megacycles, or what is the same thing, the very, very short or microwaves.

## Most Amateurs in General Class

Most radio amateur licenses will still be what is now known as the general class, formerly class B. There is also an advanced class license, formerly class A, and next year amateur extra class licenses will be available for those who have had regular licenses for two years, can do 20 words per minute code and pass stiffer examinations.



**TEN-YEAR-OLD "HAM"**—Jane Bieberman of Bala-Cynwyd, Pa., whose father operates radio amateur station W3KT, became a licensed radio amateur, passing the code and written examinations for a regular amateur license and became W30VV at the age of 10.



The Federal Communications Commission, with Washington headquarters and many branch offices, regulates amateur radio, gives examinations and issues licenses, just as it controls all wire, radio, TV and similar communication. The American Radio Relay League, with headquarters at West Hartford, Conn., is the organization of radio amateurs and issues information and material on how to get started in amateur radio.

Boys and girls of 9 to 10 have been able to qualify for amateur radio licenses. There are no age limits. Thousands of amateurs are men and women who have radio as a hobby just as others play golf, go fishing and build furniture in a home workshop. The average age of America's 90,000 amateurs is now about 33, although in 1926, when radio was younger, amateurs were younger with an average age of 26. Now there are many well over three score and ten still pounding their keys joyfully or talking with distant radiowave friends of long standing, most of whom they have never seen.

Some amateurs have very elaborate "rigs," as the receiver-transmitter combinations are

called. Many of them build their own even in these days of production-line equipment. Some amateurs get pleasure from building up and tearing down to try out new ideas and improve their sets and their knowledge.

Networks of radio amateurs, organized as rigorously as our military reserves and volunteer firemen, are ready and in frequent operation as an aid to the nation's communications, available to the military, the Red Cross and other such agencies for emergency use. The portions of the radio bands available to amateurs are busy with signals day and night. Even language is no real barrier in talking overseas for there is a Q code that substitutes for frequently used phrases no matter what language the distant amateur speaks.

Amateur radio transmissions are limited only by the dimensions of the earth. It is an everyday occurrence for experienced amateurs to talk around the world. Even novices find no difficulty in communicating several thousand miles.

Unseen and unheard by most of us, radio amateurs bound together by their electromagnetic waves have created their own united world.

Science News Letter, July 14, 1951

## MEDICINE

# Children Want Health

► YOUNGSTERS want good health and will quickly improve their physical status when nutrition teaching is put on a personal basis, Anne M. Clemmons of the University of Kentucky and Harriet Williams, Lexington Junior High School, Lexington, Ky., found in a study of 80 ninth-graders.

At the opening of the experiment, more than 58% of the class were on a downward trend of growth. This high percentage was discussed in class and it was agreed by all that irregular habits of sleeping and eating as well as extra activities over the Christmas holidays were the probable causes.

Each child brought out the reasons he thought applied to his case, such as competitive basketball or a job which was more than his body could take care of at his stage of growth. As examples of the effectiveness of this discussion, one boy gave up basketball and another a job. Both tried to improve their food habits and both were back to their expected curve of growth in six weeks, wiping out their previous sharp drop.

At the end of six weeks, three weeks after the close of the nutrition lessons, the students were again weighed and measured. This time 50% of the class showed an upward trend in growth. Classroom discussion showed that changes in the growth trends were due to application of the principles learned in the nutrition lessons. For instance, one boy had gained in spite of the same work which he had carried on in the former period when he had showed

a downward trend. His explanation was that he had improved his nutrition enough to care for the extra activity.

Details of the study were reported at the meeting of the American Home Economics Association in Cleveland.

Science News Letter, July 14, 1951

## PHOTOGRAPHY

# Photos Made Without Washing, Save Water

► PHOTOGRAPHIC FILMS and prints can be finished without the customary washing in water in a new process developed by the U. S. Army Signal Corps at Fort Monmouth, N. J.

The process is particularly suitable for military forces in advanced areas where water is scarce. In addition to eliminating the need for water, it decreases the processing time. It is about ten times faster for films and twice as fast for prints as conventional methods.

Specially formulated Amidol developer, a stop bath and stabilizer solutions are used. The heart of the new stabilizing process is a solution containing thiourea. Water-resistant photographic paper is also used. This cuts down drying time.

In ordinary photo processing methods, films and prints are fixed in a hypo bath to remove unexposed silver salts. In this process the thiourea converts the unexposed silver compounds to a light-insensitive form.

Science News Letter, July 14, 1951

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2126-Q	85	.75	2134-Q	85	1.50
2127-Q	110	1.00	2136-Q	110	2.00
2128-Q	120	1.00	2137-Q	120	2.00
2129-Q	133	1.00	2138-Q	133	2.00
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2131-Q	175	1.00	2140-Q	175	2.00

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## CHEMISTRY

## Blotting Paper Tells Water in Pure Alcohol

► SIMPLY BY putting some alcohol on a specially treated strip of blotting paper, small quantities of water in alcohol can be detected.

This new and delicate chromatograph test, developed by Dr. J. E. C. Stringer of Vickers-Armstrong at Newcastle-upon-Tyne, England and reported to the journal *NATURE* (June 30), is expected to determine from a tenth to a half percent of water in alcohol used for chemical purposes.

The alcohol being tested is allowed to soak up through a strip of paper, with two chemicals impregnated in it. First it reaches a zone of iron sulfate, which is dissolved in the water and not in the alcohol. When this salt picked up by the water reaches the area containing potassium ferricyanide, a blue coloration consisting of ferric ferrocyanide is produced. The extent and intensity of the coloration depends upon the amount of water present.

Unlike beverage alcohol, that used for chemical work should contain little water and it is often desired to know just how much.

Science News Letter, July 14, 1951

## STILL A FEW LEFT

### BLACKLIGHT LAMP



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## ORNITHOLOGY

## NATURE RAMBLINGS



Humming-Bird

► LIKE A big bee in feathers, the humming-bird darts about the garden, suspended in mid-air on its invisibly vibrating wings while it probes deep-throated flowers for food. It is always a mental effort to regard this dynamic molecule of life as a bird, it is so small and flies so much more in the manner of an insect.

Other small birds can hover for short moments, but the fluttering of their wings is relatively slow and one can see them as they beat. No other bird has so perfected the art of hovering flight as the humming-bird.

In the eastern United States, there is only one species of humming-bird, the ruby-

throat. This one, however, ranges everywhere east of the Rockies, well up into Canada, where you would hardly expect to find tropical visitors. For the humming-birds in general are of the tropics, and ours is a commuter who comes north to rear a family and then returns to a warm climate for the winter.

Ruby-throated humming-birds winter all the way from Florida and Texas south to the Isthmus, and appear sporadically in Cuba; in spite of their diminutive size they are quite evidently efficient travelers.

The humming-bird does not spend all day at that dizzying occupation of flying at the rate of a mile a minute without moving from the spot. That kind of flying requires the burning up of too much energy to be kept up indefinitely. He does it in short spurts, resting between whiles on a slender twig or perhaps a trellis wire, preening his feathers.

Nor does the humming-bird feed, insect-wise on honey, as is often imagined. He likes meat as well as anybody, only he is willing to take it in little bits—as tiny insects in the bottoms of the flowers. That is really what his long, probing beak is after most of the time.

The best way to secure regular visits from humming-birds is to plant a trumpet-creep vine somewhere about the premises. The deep-throated, flame-colored flowers of this tropical plant are the favorite food-counters of these hovering, humming, darting small bits of feathery energy. But they can be lured by other deep or long-spurred flowers that common bees have trouble getting into, for example, the common annual larkspur.

Science News Letter, July 14, 1951

## PHYSICS

## Lightning's Thunder Stolen

► NEW YORK'S Empire State Building not only initiates lightning strokes but sometimes even steals lightning's thunder.

Dr. Karl B. McEachron, General Electric Co. scientist, told the American Physical Society meeting at Schenectady, N. Y., that the extreme height of the world's tallest building sometimes squelches the thunder that normally accompanies all lightning strokes.

A 15-year study shows that the building's altitude sometimes enables it to initiate its own silent lightning strokes, counteracting thunder-producing lightning charges building up in the clouds above.

About 80% of the lightning strikes on the Empire State Building, which have reached as high as 48 in a single summer, are initiated from the top of the building itself. Bolts emanating from the building occasionally have no thunder-producing current peaks and hence no frightening thunderclaps accompany the colorful lightning flashes.

When lightning strikes normal terrain, the stroke is built up in the clouds and attracted toward the earth where an opposite charge has been built up. In these normal cases, the lightning stroke is always initiated in the sky and is always accompanied by thunder.

In the case of the Empire State Building, the earth's charges become concentrated in a single spot, the peak of the building, and shoot off toward the opposite charges in the clouds in a series of steps, about 150 feet in length each 30 millionths of a second, beating lightning of the clouds to the punch.

Regarding the effect that the recently-erected 222-foot television antenna might have on the building, Dr. McEachron said that while lightning strikes might be increased slightly, the addition of only 200-odd feet to the 1,250 foot-high building could not be expected to have any appreciable effect.

Science News Letter, July 14, 1951



## AERONAUTICS

# New Agricultural Airplane

► AG-1, AG standing for agriculture, is a new airplane, the first designed especially for a single job—applying to the land from the air insecticides, crop seeds and fertilizers. It is well suited for this job because it can carry a heavy load, fly low and slow, and take off and land on a short unimproved runway.

The plane was constructed under contract with the U. S. Civil Aeronautics Administration by an aircraft research center at the Texas Agricultural and Mechanical College. At a recent demonstration by the CAA, the plane took off from a rough runway, flew at speeds as low as 45 miles an hour, made tight turns at the ends of the field, and was brought to a stop in a space about three times its length after it touched the ground.

The plane can carry 1,200 pounds of insecticide spray or dust, and it can operate

for three hours without refuelling. In its design, safety was a prime factor. Its high-lift wing, full-span slotted flaps and slot-lip ailerons all contribute to safety. Many other safety devices are included. Important is the wide landing gear with heavy tires.

Spraying and dusting farm crops with ordinary planes is accompanied by many hazards. The necessary low-flying constitutes one; quick turns at the ends of the field present another. CAA records show that some 5,000 planes are now used in America for dusting, spraying, seeding and fertilizing purposes. Many of them are war surplus and other converted planes. During 1950, 439 accidents in crop-control flying are recorded. The new plane is expected to cut this accident rate down substantially.

Science News Letter, July 14, 1951

## MEDICINE

## Child "Dope" Addicts

► ONE BRIGHT spot in the grim picture of child "dope" addicts now publicized is that rehabilitation of these youngsters into healthy citizens should be easier than it is with grown-up addicts.

Here is a second bright spot: Addiction of children and adolescents to narcotic drugs, from marihuana to heroin and morphine, apparently is not so widespread throughout the whole nation as it seems from accounts of the current investigations. There has been some increase among certain groups and in quite selected areas. Children in certain racial groups, Negroes and Puerto Ricans, apparently have been the chief victims.

Some teen-agers have been admitted for treatment at the U. S. Public Health Service's hospital for narcotic addicts at Lexington, Ky. Experience with these youngsters shows that children are not likely to be more susceptible to drug addiction than grown-ups. Physically and mentally, they respond to the drugs in the same way grown-ups do, except that a child's psychological problems may be different from those of grown-ups.

Treatment to cure them is the same as for grown-ups. It consists in withdrawing the drug while keeping the patient, child or adult, under careful supervision. Physical health is built up through proper diet and regulated activity and sleep.

Rehabilitation through education is part of the treatment. In this, the child's youth counts for him, since re-education is simpler at earlier than at later ages.

Science News Letter, July 14, 1951

## ICHTHYOLOGY

## Death Barrier for Lampreys

► AN ELECTRICAL "death fence" and a physical barrier have so far kept every sea lamprey from reaching spawning grounds at the head of the Ocqueoc River in Michigan.

An eel-like fish with a suction cup mouth, the sea lamprey threatens the Great Lakes commercial and game fishing with destruction unless stopped. A similar electrical screen was used last fall to keep the small sea lampreys from reaching Lake Michigan, but that method proved too expensive, Paul Thompson of the fishery biology division of

the U. S. Fish and Wildlife Service told SCIENCE SERVICE.

The sea lamprey is now, about the middle of July, at the end of its spawning season. Scientists hope that by keeping the lamprey from its spawning grounds in this trial run, they will be able to stop the parasite. If successful, the electrical death fence will be put up on every possible stream, but first scientists want to know whether the barrier effectively prevents the sea lamprey from spawning.

Another method for ridding the Lakes

of the lamprey has been suggested by Dr. Alfred Perlmutter of the New York State Conservation Department. He has shown that the American eel will gobble up the young sea lamprey, or ammocoete, attracted to it by its wiggling in the mud. The American eel is also mud-burrowing.

This would be setting one predator to prey upon another, an attack method that has worked in getting rid of other pests. The American eel would be self-liquidating, since it does not spawn in fresh water. It has, however, a rather long life, believed to be 12 or 15 years.

Science News Letter, July 14, 1951

## LET THESE GREAT CONTRIBUTORS TEACH YOU SCIENCE



1. **F. W. BRIDGMAN**, winner of the Nobel prize in physics. His "NATURE OF PHYSICAL THEORY" explains relativity theory, wave mechanics, other advanced concepts. "It can easily be read in about three hours, but it will then demand to be reread, parts of it several times over."—Review of Scientific Instruments, 149pp. 5½ x 8. \$2.25

2. **MAX BORN**, who helped develop quantum theory. In "THE RESTLESS UNIVERSE," Prof. Born explains the workings of electrons, cathode rays, invisible light and other "mysteries" of modern science. New 1951 revised ed. Almost 1000 illustrations. 7 animated diagrams. 325pp. 6½ x 9¼. \$3.95

3. **HERMANN WEYL**, important contributor to relativity theory. Masterly intro. to Maxwell's theory, analytic geometry, tensors, relativity, etc., in "SPACE-TIME-MATTER." 348pp. Index. 18 diagrams. Bibl. ref. 5½ x 8. \$3.95

4. **WERNER HEISENBERG**, Nobel prize winner in physics. His "PHYSICAL PRINCIPLES OF THE QUANTUM THEORY" gives complete physical picture of contributions of Simon, Compton, Einstein, Bohr, et al. Ideal for chemists and physicists not in immediate quantum theory field. 192pp. 5½ x 8. \$2.75

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8. **LEWIS AND LANGFORD**, two well-known contributors to the literature on math. logic. Their "SYMBOLIC LOGIC" is one of the most frequently cited works on the subject. Recommended by most teachers and authorities in field. Covers logical paradoxes, historical development of symbolic logic, truth-value systems, matrix method, modal logic, many-valued logic, existence theorems, etc. "An authoritative and most valuable treatise on symbolic logic by two of the most distinguished exponents of that science . . . Of great assistance to the student approaching the subject for the first time . . . deserves the serious consideration of specialists."—London Times. 5½ x 8. 512 pp. \$4.50

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**AMERICAN WILDLIFE AND PLANTS: A Guide to Wildlife Food Habits—the Use of Trees, Shrubs, Weeds and Herbs by Birds and Mammals of the United States**—Alexander C. Martin, Herbert S. Zim and Arnold L. Nelson—*McGraw-Hill*, 500 p., illus., \$7.50. Prepared under the direction of the United States Fish and Wildlife Service at the Patuxent Research Refuge, Laurel, Md.

**ANTIPYRINE: A Critical Bibliographic Review**—Leon A. Greenberg—*Hillhouse*, 136 p., \$4.00. A reference tool for all research workers studying analgesic drugs.

**ATOMIC EXPLOSION, FRENCHMAN'S FLAT, NEV.: U. S. Atomic Energy Test Program, Jan.-Feb., 1951**—Atomic Energy Commission—*Govt. Printing Office*, 1 p., 17x20, 25 cents. A four color process reproduction of a striking natural color official photograph. (See p. 19.)

**BASIC EXERCISES IN COLLEGE BIOLOGY**—James A. Dawson and William Etkin—*Crowell*, 232 p., illus., paper, \$2.25. A basic biology manual providing the student with clear and complete instructions, both verbal and visual.

**CHEMICAL SPECTROSCOPY**—Wallace R. Brode—*American Society for Testing Materials*, 47 p., illus., paper, \$1.35. The 1950 ASTM Edgar Marburg Lecture on the development and use of spectroscopic methods in analytical control.

**CIVIL DEFENSE IN MODERN WAR: A Text on the Protection of the Civil Population against A-B-C Warfare**—Augustin M. Prentiss—*McGraw-Hill*, 429 p., illus., \$6.00. A program of civil defense covering every major aspect from atomic attack to bacterial and chemical warfare.

**CONTROL OF HOUSEHOLD INSECTS**—A. E. Michelbacher and Deane P. Furman—*California Agricultural Extension Service*, 34 p., illus., paper, free upon request to publisher, University of California, 22 Giannini Hall, Berkeley 4, Calif. Measures to be taken against the insects commonly found in California homes but many are of general distribution.

**CREATIVE HANDS: An introduction to Craft Techniques**—Doris Cox and Barbara War-

ren—*Wiley*, 2nd ed., 381 p., illus., \$6.50. A book compiling the numerous craft techniques and designed especially for the beginner.

**THE DINOSAUR BOOK: The Ruling Reptiles and Their Relatives**—Edwin H. Colbert—*McGraw-Hill*, 2nd ed., 156 p., illus., \$4.00. The story of amphibian and reptilian evolution with particular emphasis on the dinosaurs.

**ESSENTIALS OF CHEMISTRY**—Alfred Benjamin Garrett, Joseph Fredric Haskins and Harry Hall Sisler—*Ginn*, 570 p., illus., \$5.00. An introductory text for students not intending to specialize in the field.

**EXPERIMENTAL STUDIES IN BASIC COLLEGE CHEMISTRY**—Everette L. Henderson—*Crowell*, 246 p., illus., paper, \$2.50. A workbook for Babor's "Basic College Chemistry," although useful with other texts.

**GENERAL COLLEGE CHEMISTRY**—Joseph A. Babor and Alexander Lehrman—*Crowell*, 3rd ed., 800 p., illus., \$5.00. A text intended for the more able and scientifically minded students in freshman chemistry.

**GENETICS IN THE 20TH CENTURY: Essays on the Progress of Genetics during Its First 50 Years**—L. C. Dunn—*Macmillan*, 634 p., illus., \$5.00. The thought and study of some of the most distinguished geneticists of our day as represented in invitation papers at the Golden Jubilee of Genetics at the Ohio State University.

**GOOD SCHOOLS DON'T JUST HAPPEN**—*Science Research Associates*, 24 p., illus., 10 cents. This booklet lists the goals of school and community and tells how the problems of youth may be met by the individual.

**HIGHWAYS WITH A NARROW MEDIAN**—*Highway Research Board Bul.* 35, 95 p., illus., paper, \$1.50. A summary of the reports from seven State Highway Departments on narrow highway safety islands under various conditions.

**INDEX TO THE SEMIANNUAL REPORTS TO CONGRESS—U. S. Atomic Energy Commission—Govt. Printing Office, 40 p., paper, 20 cents. The index to the reports that cover the unclassified progress and activities of the AEC from Jan. 1947 to Jan. 1951.**

**THE MEASUREMENT OF LOW AIR SPEEDS BY THE USE OF TITANIUM TETRACHLORIDE: Research Report 25**—Elmer G. Smith, Bob H. Reed, and H. Darwin Hodges—*Texas Engineering Experiment Station*, 22 p., illus., paper, single copies free upon request to publisher, Texas Engineering Experiment Station, College Station, Texas. After soap bubbles, puffs of smoke and toy rubber balloons failed, titanium smoke was successfully used for measuring low air speeds under 100 feet per minute.

**MOST-OFTEN-NEEDED 1951 RADIO DIAGRAMS AND SERVICING INFORMATION WITH COMPLETE INDEX**—M. N. Beitman—*Supreme Pub-*

*lications*, 192 p., illus., paper, \$2.50. A manual of 1951 radio service material including AM and FM types, portables, auto sets, combinations, and record changers with a complete index to the previous ten radio and five TV volumes.

**MUSICAL ACOUSTICS**—Charles A. Culver—*Blakiston*, 3rd ed., 215 p., illus., \$4.25. An explanation of the physical principles involved in the production and transmission of musical sounds.

**NATIONAL AIRPORT PLAN, 1951**—Civil Aeronautics Administration—*Govt. Printing Office*, 218 p., illus., paper, \$1.25. A plan and program prepared to aid in development of a national system of airports which will care for all the needs of civil aviation. (See p. 25.)

**NATIONAL DEFENSE AND HIGHER EDUCATION: The Report of a Conference of Representatives of Member Organizations of the American Council on Education at Washington, D. C., Jan. 19-20, 1951**—Francis J. Brown—*American Council on Education*, 121 p., paper, \$1.00.

**THE NORTHERN AND CENTRAL NOOTKAN TRIBES**—Philip Drucker—*Smithsonian Institution, Bureau of Ethnology*, 480 p., illus., paper, \$1.50. An account of the social organization and culture of the Nootkan tribes of Vancouver Island.

**THE PRESERVATION OF WILDERNESS AREAS**—C. Frank Keyser—*U. S. Govt. Printing Office*, 114 p., paper, free upon request to Committee on Merchant Marine and Fisheries, Old House Office Building, Washington, D. C. An analysis of opinion on the problem prepared by the Library of Congress.

**REPORT OF THE NATIONAL ACADEMY OF SCIENCES, NATIONAL RESEARCH COUNCIL, 1948-1949**—*U. S. Govt. Printing Office*, 171 p., paper, 40 cents.

**STATISTICS OF NONPUBLIC SECONDARY SCHOOLS, 1947-1948**—Rose Marie Smith—*U. S. Govt. Printing Office*, 11 p., paper, 10 cents. Chapter 7 of "Biennial Survey of Education in the United States, 1946-48."

**THE TECTONICS OF MIDDLE NORTH AMERICA: Middle North America East of the Cordilleran System**—Philip B. King—*Princeton University Press*, 203 p., illus., \$3.75. A description of the architecture of the rock formations of the eastern United States.

**WOOD FUEL: Report of Conference at Philadelphia, May 10, 1951**—*Northeastern Wood Utilization Council Inc.*, 77 p., illus., paper, \$3.00. Describing methods recently developed to burn wood waste as fuel.

Science News Letter, July 14, 1951

## INVENTION

## New Copper-Silver Alloys Give Better Electric Joints

➤ COPPER-SILVER alloys suitable for electrical contacts where high electrical conductivity in conjunction with high strength and resistance to wear are required brought John Sykes, Enfield, England patent 2,559,031. Rights have been assigned to Enbeld Rolling Mills Limited, also of Enfield, England.

Science News Letter, July 14, 1951



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## CHEMISTRY

# Cortisone Made from Yams

Practical method of making anti-arthritis hormone, cortisone, from yams developed. Process, requiring 22 steps, promises more plentiful drug supply.

► A PRACTICAL method of making the anti-arthritis hormone, cortisone, from a wild Mexican root, instead of ox bile as now necessary, promises to make this wonder drug more plentiful in the future.

The new synthesis was worked out in Mexico by a chemical team of the Syntex Research Laboratories, American branch of which is Chemical Specialties Co., Inc., New York. It requires 22 steps but is a practical process which will be used in an industrial plant in Mexico to be in production early in 1952.

Ever since cortisone was demonstrated to be effective in treating rheumatism and many other disorders in 1949, there has been an intensive search for a non-animal source of material from which to make it. Only bile from ox and sheep, by-products of slaughterhouses, has been used heretofore. The starting point of the Syntex synthesis is a common tropical yam, known as dioscorea or cabeza de negra (negro head), which has been the starting point for Syntex production of other hormones such as testosterone, estradiol, progesterone and pregnenolone.

Two years ago the Mexican chemists began an intensive attempt to start with the yam and come out with cortisone. A three-stage attack brought success, through a combination of research in their own and other laboratories. The principal scientists of Syntex were Dr. George Rosenkranz and Dr. Carl Djerassi, with Dr. Gilbert Stork of Harvard as consultant.

Success in two of these stages is just being announced. The July issue of the JOURNAL OF THE AMERICAN CHEMICAL SOCIETY tells how cabeza extract is converted into a complex substance known as 11-keto-allo-pregnanolone. Previously in the same journal the conversion of this substance into Reichstein's Compound D was re-

ported, and in the British journal NATURE (July 7) a relatively simple three-step procedure for transforming this compound into cortisone was detailed.

Thus a synthesis of cortisone has been developed that is not dependent upon the fluctuating supply of cattle but begins with yam roots that even now are being processed at the rate of 500 tons a month.

Dr. I. V. Sollins of Chemical Specialties Co., New York, explained that Syntex chemists expected to be able to eliminate in the future five or six of the 22 steps in the process.

The total synthesis of cortisone in 60 steps, as a chemical process that will not be applied practically, was also announced. The research of other scientists, notably Sir Robert Robertson of England, and Prof. Robert B. Woodward of Harvard, were applied in working out this total synthesis.

While the inedible yam dioscorea grows wild, it was placed under cultivation two years ago when it proved to be valuable as a raw material for drug synthesis. It is now being grown in Puerto Rico as well as Mexico to assure a continuing supply, not only for cortisone production but for other hormones as well.

Science News Letter, July 14, 1951

## AERONAUTICS

## All-Canadian Jet Fighter Readied for Flight Test

► THE FIRST all-Canadian jet fighting airplane is being readied for its first flight, it was revealed by the builder, A. V. Roe Canada, Ltd., of Malton, Ontario. Its notable feature is the two Orenda turbo-jet engines with which it is powered. The Orenda is rated as one of the world's most powerful jet engines.

This new engine has already undergone many types of bench tests and late in 1950 was used to power an American Sabre F-86. During the present year an Orenda-powered Sabre fighter flew from Toronto to Montreal at an average speed of 665 miles per hour. The engine is claimed to be more powerful than the jet used in the Sabre when it established the world's speed record of 670 miles per hour.

The plane in which the new engine will be used is the Avro Canada CF-100. It is a long-range all-weather fighter, designed particularly to meet the defense problems of Canada. CF-100s already in use are powered with British engines.

Science News Letter, July 14, 1951

## ● RADIO

Saturday, July 21, 1951, 3:15-3:30 p. m. EDT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. George K. Bennett, president, Psychological Corporation, New York, will discuss "Psychology at Work."

## INVENTION

## Remove Nitrogen to Get High Heat Value Gas

► GAS OF a high heating value, needed in certain industrial processes, is obtained from natural gas by removing the nitrogen from it by a process which was awarded patent 2,557,171. It was issued to William W. Bodle, North Kansas City, Mo., and Walter W. Deschner of Kansas City, Kans. J. F. Pritchard & Co., Kansas City, Mo., has obtained the patent rights.

Science News Letter, July 14, 1951

## SELLS FIRST STORY AT 60



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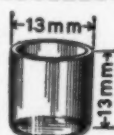
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⚙️ **PROTECTIVE MASK**, for factory, mine and farm workers, is an aluminum shield to fit over mouth and nose, inside of which is a replaceable filter to catch dust and particles in the air. This half-ounce shield is cool and comfortable, and its disposable filters are easily replaced.

Science News Letter, July 14, 1951

⚙️ **FUMIGATION TENT**, for use in the chemical treatment of soil with methyl bromide gas to kill weeds, insects and nematode worms in seed-beds, is a sheet of durable plastic in a wide roll. In use it is unrolled over a support of boxes and boards, and the edges covered with soil.

Science News Letter, July 14, 1951

⚙️ **"ROUND" WAGON** for youngsters has a circular body which rotates as the wagon is pulled. It is a three-wheel affair whose body rotates fast enough for fun but not too fast for safety. It can be used also as a standard wagon; an easily reached control near the front eliminates rotation.

Science News Letter, July 14, 1951

⚙️ **EDGE TRIMMING** attachment for lawn mowers, recently patented, is a rotary vertical cutter positioned exterior to either wheel of the mower. Attachment is by means of a U-shaped arm that fits over the lawn mower wheel, and the device can be rotated to an inoperative position when desired.

Science News Letter, July 14, 1951

⚙️ **HIGH-INTENSITY LIGHT** for airport runways has a thimble-shaped one-piece lens covering a 200-watt electric bulb,



as shown in the photograph. Two flattened sides of the lens emit high candlepower beams along the runway, a curved side

gives out a fan of light, and another curved side gives a glare-free glow.

Science News Letter, July 14, 1951

⚙️ **SAFETY LAMP**, for home or factory use, is a flashlight with ordinary batteries but with a device operated by the electrical current of the building's lighting system which turns the flashlight on in case of power failure. To be ready for use, it is plugged into an ordinary AC or DC outlet.

Science News Letter, July 14, 1951

⚙️ **ELECTRIC RAZOR**, a recently patented device which can be used for either a dry or a lather shave, is composed of a tubular handle containing the motor and a circular blade on the end of a shaft. An outer guard prevents the rapidly-rotating blade from cutting the skin.

Science News Letter, July 14, 1951

⚙️ **OPEN CAB** for the tractor consists of a heavy-duty canvas to cover the motor which extends backward on both sides of the driver. On the cab portion it carries a transparent plastic rigid sheet extending upward to form a windshield and clear-vision side protection.

Science News Letter, July 14, 1951

## Do You Know?

Summer field-grown tomatoes are about twice as rich in vitamin C as winter and fall greenhouse-grown fruit.

A star of the "first magnitude" is about 2.5 times as bright as one of the second, and is exactly 100 times brighter than one of the sixth magnitude.

Cheese *why* is used in making some types of ice cream.

Poison ivy is a *sumac*, in spite of the dissimilar appearance.

American *peppermint*, a favorite flavoring, comes from planting stock imported from England about 1812.

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